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BNFL 3013 Containers for Radioactive material Transportation

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Disclaimer

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BNFL 3013 Containers for Radioactive Material Transportation, Rev.1

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BNFL 3013 Containers for Radioactive Material Transportation

Background

The Strategic Arms Reduction Treaty 1 (START1) was signed at the end of July 1991. The START1 Treaty reduced the number of nuclear weapons that the United States and the Soviet Union could possess. All excess special materials in the United States were sent from the weapons complex to the US Department of Energy (DOE) for disposition.

The DOE Standard, *Stabilization, Packaging, and Storage of Plutonium-Bearing Materials*, DOE-STD-3013-1994 — i.e., the 3013 Standard — was issued in December 1994, by the DOE weapons complex for the stabilization, packaging and safe storage of excess plutonium-bearing metal and oxides. Based on the 3013 Standard, the BNFL container was designed and developed to remove excess plutonium material from the Hanford and Rocky Flats Sites. The BNFL 3013 containers were put into certified transportation packages and sent to the Savannah River Site for storage and later disposition.

The Defense Nuclear Facilities Safety Board monitors the 3013 Standard and all related activities. The non-weapons DOE complex must comply with the 3013 Standard and all related requirements.

Description

The requirements for designing and constructing a 10 CFR 71 qualified containment system and the BNFL 3013 Container are compared below in Table 1. The most significant difference between the BNFL 3013 Container and a 10 CFR 71 qualified containment vessel is that the 10 CFR 71 containment system must meet Section III, Subsection NB of the ASME Boiler & Pressure Vessel Code (the Code), whereas the BNFL 3013 Container only meets Section VIII, Division 1 of the Code for manufacture.

Except for the final lid weld, the 3013 containers are fabricated to ASME Section VIII, Division 1 of the Code. The outer 3013 container is considered a pressure vessel, but is not pressure tested. Since the manufacturer does not perform the final weld for the lid, the container is not stamped ASME. The final weld is made after the plutonium bearing contents are loaded into the 3013 container.

The outer can welds are full penetration welds. The welds are radiographed before machining to ASME V, Article 2, with defect acceptance levels to ASME VIII, Division 1, UW 51 and Appendix 4, and are dye penetrant tested to ASME V, Article 6, with defect acceptance levels to ASME VIII, Division 1, Appendix 8. Qualification of welding procedures and welders/operators must meet the requirements of the ASME Code, Section IX, and all welds must conform to ASME Section VIII, Division 1 requirements, and be subjected to 100% nondestructive examination, as described in the preceding sentence. However, the drawing notes do not apply to the lid weld, which is shown on the drawing for information purposes only. The lid weld is not a full penetration, complete fusion weld.

TABLE 1
10 CFR 71/NRC Regulation Qualified Containment vs. BNFL 3013

	10 CFR 71	**3013**	**Equivalent?**
QA	10 CFR 71 Subpart H	10 CFR 830.120	No
Design & Fabrication	ASME Section III	ASME Section VIII	No
Pressure Test	Yes (1.5 × MNOP)	Not Required	No
Leak Test	ANSI N14.5 *Leaktight*; $\leq 10^{-7}$ Ref. cc/sec (air)	ANSI N14.5 *Leaktight*; $\leq 10^{-7}$ Ref. cc/sec (air)	Yes
Base Metals	ASME III	ASME SA-240 Grade 316L	Yes
NDE of Base Metals	ASME Section III	ASME Section VIII	No
Weld Design	ASME Section III	ASME Section VIII	No
Weld Metal Requirements	ASME Section III	ASME Section VIII	No
NDE of Welds	100% surface and volumetric	For lid weld radiography on sampling basis; no dye penetrant	No
Drop Testing	Suite of drop tests as part of packaging qualification	Drop tests as per 3013 Standard	No

In most cases, the weld receives 100 percent visual inspection, but is inspected only on a limited basis by radiography.

The 3013 Standard requires compliance to 10 CFR 830.120 (a 10 element QA program), instead of the more rigorous, 18 element program of 10 CFR 71 Subpart H.

In summary, the 3013 container cannot be given credit for containment as defined in 10 CFR 71.

Conclusions/Limitations

The 3013 container does not provide containment as specified in 10 CFR 71. As such, it must be assumed that, for the 3013 containers, in-leakage and out-leakage of gasses, vapors, liquids, and aerosols can occur. The 3013 container must, therefore, be put into a certified containment system for storage and transport to meet 10 CFR 71 Regulatory requirements and the applicable DOE Orders, i.e., DOE O 460.1C, and DOE O 461.1A.